Long Distance Learning

Glacier Bay
National Park and Preserve
National Park Service

Rivers of Ice

A Natural and Cultural History of Glacier Bay's Glaciers

Activity: Rivers of Ice
School Subjects: Earth Systems, History of Science
Grade Level: 5-8 **Time Requirement:** 45 minutes

National Standards Addressed

NS. 5-8.1 Science as Inquiry
NS. 5-8.4 Earth Science and Space Science
NS. 5-8.6 Personal and Social Perspectives
NS. 5-8.7 History and Nature of Science

Next Generation Science Standards

MS. History of Earth: MS-ESS2-2
MS. Earth's Systems: MS-ESS2-4
MS. Weather and Climate: MS-ESS3-5

Lesson Overview

Glacier Bay National Park has a dynamic glacial history. The area and its people have experience and observed the tidewater glacier cycle of advance and retreat. Today, Glacier Bay is a place of scientific research where scientist conduct studies to understand how glaciers function and what their future may be.

Lesson Objectives

By the end of the lesson, students will be able to:

- Relate the glacial history of Glacier Bay over the last 500 years.
- Recognize that scientific understanding of glaciers and their impact on the environment has evolved in the past two centuries.
- Describe the process of glacial formation.
- Understand the difference between climate and weather
- Recognize the potential effects of a changing climate on glaciers.
- List at least 4 geologic signs of glaciers.
- Regard Glacier Bay (and all National Park sites) as places of inquiry, investigation, and discovery (e.g. a living laboratory).

Materials

Prior to the program, Glacier Bay National Park will send you (by mail or digitally, as per request):

- Glacier vocabulary list
- Glacier parts worksheet

Prior to the program, the teacher should gather the following materials:

- Marshmallows (large or small)

Background Information

Glacier Bay is home to a dynamic tidewater glacier ecosystem that is also a living laboratory, cultural homeland, and spectacular wilderness destination. Several hundred years ago, Glacier Bay was home to the Huna Tlingit who thrived on a grassy outwash plain in front of a glacier. As a result of the Little Ice Age in the 1700s, the glacier began to advance rapidly, forcing the Tlingit to flee. The glacier reached its maximum extent in the late 1700s and by the 1790s it had begun to retreat catastrophically. In the last 250 years, the glacier has retreated 65 miles, the fasted glacier retreat in scientific history. Today, visitors and scientists from all over the world visit Glacier Bay to learn about and marvel at the glaciers, wildlife, plants, and cultural history of this special place.

Glacier Bay has played an important role in the scientific study of glaciers. Glaciology, the study of glaciers, started in the European Alps in the nineteenth century. Influenced by these thinkers, well-known conservationist John Muir traveled to Glacier Bay four times in order to study glaciers and the land left behind after a glacier has retreated. Glacier Bay National Park continues to be a place for important scientific research and monitoring of glaciers. Over the years, the methods used to study glaciers have changed, but the desire to learn more has not.

The climate and location of Glacier Bay combine to create excellent glacier-making conditions. Storms over the ocean dump lots of snow in the Fairweather Mountain Range. This snow compacts into ice, forming glaciers. Glacier Bay has an unknown number of terrestrial glaciers, a large ice field, and 13 tidewater glaciers. All these glaciers are remnants of the much larger glacier that forced the Tlingit from their homeland. The historic advance and retreat of the large glacier is part of the natural tidewater glacier cycle. However, as the climate warms, most of Glacier Bay's glaciers are following the global trend and shrinking, though several are staying stable or advancing. The effects of global climate change are visible in Alaska and Glacier Bay.

Glacier Bay National Park is also an ideal place to see and study the ecosystem response to retreating glaciers. The glaciers sculpt the landscape, carving out deep fjords, smoothing down mountainsides, depositing sediment and more. As the glaciers leave, plant and animal life slowly returns. Glacier Bay National Park is a designated Biosphere Reserve, World Heritage Site and wilderness site ensuring that this special place will remain protected, intact and pristine for generations to come.

Procedure

Ideally, this program will be one part of a larger study of glaciers, earth systems, or the history of science.

Prior to the program: Review glaciers. Have students generate questions to ask the ranger about glaciers, the glacial history of Glacier Bay, or the significance of National Parks.

During the program:
Have the students seated at their desks or in a group, wherever they can see the videoconferencing screen. Pass out the worksheet to all students. The program will be interactive and the ranger will ask the students to answer questions, solve problems, and interpret data. The ranger will share some information about glaciers in a lecture format and engage the students in discussion. At times, the ranger will ask the students to fill in their worksheets based on information presented. The teacher should assist the ranger by calling on students. Throughout the program, students will have opportunities to ask the ranger questions.

Further Information

The park website is filled with information. Learn more about glaciers at http://www.nps.gov/glba/naturescience/glaciers.htm

To see contemporary and historic glacier images, visit http://www.usgs.gov/climate_landuse/glaciers/repeat_photography.asp

For more information on climate change in National Parks, visit
http://www.nps.gov/subjects/climatechange/index.htm